

The following synopsis of results of the operations in these sixteen additional cases of chronic tympanic vertigo shows that the highest average of success was attained in the relief of vertigo, as in the first series. In the incidental results of the operations the tinnitus shows a higher average of relief than the deafness. In Cases XI. and XXIV. there was no relief in any respect.

Results. Vertigo relieved at once in ten cases; vertigo relieved gradually in four cases; vertigo unchanged in two cases; tinnitus lessened in thirteen cases; tinnitus unchanged in three cases; hearing improved in nine cases; hearing unchanged in seven cases.

SOME INVESTIGATIONS AS TO THE VIRULENCE OF THE
DIPHTHERIA-BACILLI OCCASIONALLY FOUND IN
THE THROAT-SECRETIONS IN CASES PRE-
SENTING THE CLINICAL FEATURES
OF SIMPLE ACUTE ANGINA.

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It is very difficult to dislodge from the minds of most practitioners of medicine the purely anatomical conception of diphtheria. Up to the period beginning with the discovery of the Klebs-Löffler bacillus and the development of the methods of bacteriological examination in the diagnosis of this disease, diphtheria was generally regarded as an inflammation of the respiratory mucous membrane, characterized by the formation of a false membrane, and this false membrane was considered to be the diagnostic feature of the disease.

Notwithstanding that previous clinical experience had shown that this was not a reliable criterion for the diagnosis of diphtheria, and notwithstanding that the evidence derived from thousands of bacteriological examinations in acute throat-affections has demonstrated the fallacy of this view, there still remains the firm belief with a large proportion of the profession that only such cases of acute angina are to be regarded as diphtheria as present at some time in their course more or less membrane. So thoroughly has this idea become fixed, and so strong is its influence upon practice, that many even of those physicians who unhesitatingly accept the Klebs-Löffler bacillus as the essential cause of diphtheria are still guided by it in their sanitary treatment of cases of true diphtheria which simulate simple angina, and they do not regard the isolation and subsequent observation of such cases as either necessary or advisable.

Physicians readily enough acquiesce in the isolation of cases of mild scarlatina or variola until complete desquamation has occurred, and no question arises as to the danger of transmission of such diseases to other persons through contact with mild forms; but similar reasoning is not allowed to apply to diphtheria.

The observations of Roux, Koplik, Park, and others long ago proved that simple catarrhal angina, or what seemed to be clinically simple catarrhal angina, might be caused by the diphtheria-bacillus. This fact was clearly brought out in an admirable paper by Koplik, published in 1892. Long before this time Trousseau, Jacobi, and other clinicians had shown that frequently during epidemics of diphtheria clinical anginas occur which are as prostrating as those associated with the formation of membrane; and, in 1890, Roux directed attention to the fact that such cases, or very mild forms of angina without subsequent prostration, were not infrequently the origin of severe epidemics of diphtheria. The investigations of many observers, on the other hand, have proved that the presence of membrane does not necessarily indicate the existence of diphtheria, as membranous inflammations of the throat may be produced by other organisms than the diphtheria-bacillus.

The purpose of the series of investigations detailed in this paper was to fix the exact value to be attached to the ordinary routine bacteriological examinations in determining the true character of the cases described. It was desired to ascertain in how large a proportion of the cases of simple acute angina the diphtheria-bacilli would prove to be virulent in animal-tests when they appeared to be typical in form and staining. Previous experience had led us to believe that the bacilli in such cases were almost invariably fully virulent.

The cultures selected for the observations were chosen from those received at the New York Health Department laboratories, in which diphtheria-bacilli were apparently found on microscopical examination and in which the physician's diagnosis was doubtful or was tonsillitis. In some instances the diagnosis accompanying the cultures was simply tonsillitis; in others it was follicular, ulcerative, membranous or pseudo-diphtheritic tonsillitis, or pseudo-diphtheria, or acute pharyngitis, or diphtheria with an interrogation-point. When cultures were received that had some such diagnosis as those referred to, and microscopical examination showed that they contained apparently typical diphtheria-bacilli, the bacilli were plated out, pure cultures obtained, and their virulence then tested upon guinea-pigs in the usual manner.

The bacilli derived from cultures made from forty-eight cases of this type were tested, and in only three instances were the organisms found to be non-virulent. In all of the remaining forty-five cases the animal-tests showed them to be fully virulent. I may say, in passing, that

before the virulence of any culture was tested the character of the bacteria present in it was usually passed on by Dr. John S. Billings, Jr., and Mr. Alfred L. Beebe, who commonly make the routine examinations, and Dr. William H. Park and Dr. Anna L. Williams, who plated out the cultures and tested the bacilli for virulence. All these persons have had a very large experience in bacteriological work connected with diphtheria, and it will be readily understood that many cultures were thrown out as not showing typical Löffler bacilli, although they would be generally regarded as such. The subsequent history of the cases was obtained from the attending physicians by inspectors of the Health Department, and inquiry was made in each instance as to the source of infection and as to the occurrence of other cases in the family.

In four of the forty-eight cases the subsequent history could not be obtained. Of the remaining forty-four, fourteen presented throughout their illness the clinical features of typical acute follicular tonsillitis, and in all of these the reports showed that the cases were of a mild character, and convalescence was fully established in from three to five days. In three instances the course of the disease was that of a simple acute pharyngitis of a mild type. In none of these seventeen cases was there any membrane in the throat at any time during the illness, and nothing in the clinical history suggested diphtheria. In a number of them the original cultures were sent by the physician in attendance, because one or more cases of diphtheria had already occurred in the family or in the institutions in which the patients were inmates, and in others the cultures were sent simply as a matter of routine, as is frequently done by many physicians in New York City. In one additional case the early history was that of a follicular tonsillitis, from which the child was apparently entirely convalescent, when suddenly croup developed with laryngeal stenosis, and intubation was required; in another the history was that of a follicular tonsillitis, excepting that after three or four days' illness the child became hoarse and had a croupy cough. No antitoxin was administered, however, and the patient soon recovered. In the remaining twenty-five cases, while originally the diagnosis by the attending physician was follicular tonsillitis or was considered to be doubtful, ultimately membrane appeared, and the course of the disease finally was that of a more or less severe diphtheria.

Excluding the twenty-five cases in which ultimately the patients developed characteristic symptoms of diphtheria, there remain the nineteen cases which were clinically follicular tonsillitis or pharyngitis, with in two instances the development late of some laryngeal symptoms. In seventeen of these the tests upon animals showed that the bacilli found in the cultures were fully virulent.

In the analysis of this series of nineteen cases of apparently simple angina, associated with the presence of the Löffler bacillus, as to the history of contagion, it was found that four occurred among the inmates of various institutions for children, in which diphtheria was at the time prevailing. In six of the remaining there was a history of previous or subsequent cases in the family, or the child was known to have been in contact with some person suffering from diphtheria. The history on this point in four cases was not given. It will be seen, therefore, that in ten out of fifteen in which the history was obtained there was reasonable evidence of contagion.

Examination was also made of the records in these nineteen cases to show the duration of persistence of the Löffler bacillus. This could be determined in fifteen of the series. The Löffler bacilli had disappeared in most of these cases within eight days of the time of the first culture. In one instance, however, they persisted for twelve days, in another for eighteen, and in another for thirty days. No subsequent tests for virulence were made during the persistence of the bacilli.

An important question arises in this connection as to the frequency with which true diphtheria simulates simple angina. There are no data at the command of the Health Department in New York which throw any light upon this phase of the subject. It has been found, however, that where virulent diphtheria-bacilli are present in normal throats, as a rule, the history will disclose some recent exposure to diphtheria, and in a majority of the cases here described investigation proved that there was a definite source for the contagion.

From April 1st to the 28th notes were made of the clinical and bacteriological diagnosis in every case from which cultures were received in the New York municipal laboratories. The number of cultures examined was much smaller during April than during some of the winter months. For this period, however, 2042 cultures were examined. Of these, 915 were primary, 944 were secondary, and 183 were trial cultures—that is, were made from the healthy throats of persons who had been in contact with diphtheria. Of the 915 primary cultures about one-half, 450, were made by the attending physicians. The clinical diagnoses accompanying the slips in these cultures were as follows: In 54 cases, false diphtheria (usually tonsillitis); in 145, diphtheria or croup; and in 241 the diagnosis was doubtful or blank. The result of the bacteriological examination was as follows: False diphtheria, 110, in contrast with 54 diagnosticated as such; true diphtheria, 239, in contrast with 145 diagnosticated as such; and 241 in which the diagnosis was doubtful or blank. In 91 cases the bacteriological diagnosis was doubtful, either because the cultures were made too late in the disease, or were contaminated, or were unsatisfactory for some other reason.

It therefore appears that out of 450 primary cultures received from physicians from April 1st to 28th inclusive, only 239, a little more than half, proved to be true diphtheria. During this same period there were reported to the department, as diphtheria, 107 cases in which no cultures were made by the attending physicians, but those later made by the inspectors of the Department, on bacteriological examination showed no diphtheria-bacilli, and the cases were therefore declared to be false diphtheria.

These data dispose of the statement which has been so constantly made and reiterated, that, as the result of the general adoption of bacteriological examinations for the diagnosis of diphtheria, the total number of cases of this disease has been largely increased by the addition of many cases of tonsillitis and pharyngitis which were previously regarded as simple anginas. As will be seen during the period referred to, 107 cases considered as diphtheria and reported as such to the Health Department were excluded from the lists of reported cases of diphtheria by the bacteriological examination. During this same period only eighty cases considered by the physicians to be false diphtheria or of a doubtful nature were found on bacteriological examination to be true diphtheria.

There are no data at hand to show the exact proportion of cases reported as follicular tonsillitis which, on bacteriological examination, prove to be true diphtheria. The proportion, however, is small.

A large number of cultures is sent to the Department in which no clinical diagnosis is given. Some of these prove to be cases of true diphtheria and some false. Whether they present the clinical features of diphtheria, the Department has no means of ascertaining. Comparatively few physicians, however, send cultures from cases showing only the symptoms of follicular tonsillitis unless there are some reasons for suspecting the affection to be of a diphtheritic character.

The observations made on the cases detailed in this paper, while not very numerous, yet when taken in connection with those previously made in the Health Department laboratories, and the observations of Koplik and others, are sufficiently conclusive in showing that when diphtheria-bacilli typical in appearance are found in cultures obtained from cases of simple angina (cases in which there is no membrane), animal-tests, in a large majority of instances, prove that the bacilli are fully virulent. In other words, when morphologically typical diphtheria-bacilli are found in cultures made after the rather rude methods employed in diagnostic work, the result of the examinations may be generally accepted as indicating the existence of virulent diphtheria-bacilli, and the cases are to be regarded as cases of true diphtheria, unless animal-tests have shown the organisms to be non-virulent.

No.	Date.	Physician's diagnosis accompanying cultures.	Result of bacteriological examination.	Result of animal inoculation.	History of the case.	As to infection of others.	How contracted.	Remarks.
1	.....	Follicular tonsillitis.	Typical diphtheria bacilli.	Virulent.	Typical follicular tonsillitis; exudate disappeared in three days.	None.	.....	
2	.....	Follicular tonsillitis.	Typical diphtheria bacilli.	"	Typical follicular tonsillitis; exudate disappeared in three days.	None.	.....	
3	Jan. 7 1890	Diphtheria?	Many suspicious bacilli; a few typical diphtheria bacilli.	"	Clinically an acute pharyngitis; very mild.	2 cases: 1 mild; 1 very mild.	From brother.	No membrane present at any time.
4	"	Ulcerative tonsillitis.	Typical diphtheria bacilli.	"	Severe; septic; mixed infection; died.	?	.....	Antitoxin not administered.
5	"	Diphtheria?	Typical diphtheria bacilli.	"	Typical follicular tonsillitis, no membrane.	None.	.....	
6	"	Membranous tonsillitis.	Typical diphtheria bacilli.	"	Mild; tonsillar membrane, disappearing after three days.	Diphtheria prevailing in the institution.	Diphtheria prevailing in the institution.	Inmate of charitable institution; removed to Diphtheria Hospital.
7	"	Membranous tonsillitis.	Typical diphtheria bacilli.	"	Mild; tonsillar membrane, disappearing after four days.	Diphtheria prevailing in the institution.	Diphtheria prevailing in the institution.	Inmate of charitable institution; removed to Diphtheria Hospital.
8	"	Diphtheria?	Many very suspicious bacilli; a few typical diphtheria bacilli.	"	Mild; tonsillar membrane, disappearing after three days.	Diphtheria prevailing in the institution.	Diphtheria prevailing in the institution.	Inmate of charitable institution; removed to Diphtheria Hospital.
9	"	Diphtheria?	Typical diphtheria bacilli.	"	A typical case of fairly severe true diphtheria.	None.	Not known.	Attending physician habitually marks "slips accompanying cultures" "tonsillitis."
10	"	Tonsillitis.	Typical diphtheria bacilli.	"	Typical case of true diphtheria.	5 cases; the 4th case severe; the other cases mild.	.....	Antitoxin administered twice.
11	"	Tonsillitis.	Typical diphtheria bacilli.	"	Mild, slightly ill; no other particular could be obtained.	None.	.....	
12	"	Follicular tonsillitis.	Typical diphtheria bacilli.	"	Clinically follicular tonsillitis; very mild; not confined to bed.	None.	Possibly from case in house.	Antitoxin administered.
13	"	Follicular tonsillitis.	Typical diphtheria bacilli.	"	Mild at first; later clinically true diphtheria with extensive membrane.	None.	.....	Patient well isolated.
14	"	Follicular tonsillitis; possibly diphtheria.	Extremely small diphtheria (?) bacilli.	"	Very mild tonsillitis; no false membrane at any time.	None.	.....	
15	"	Tonsillitis.	Small, rather atypical bacilli.	Non-virulent.	Mild; "seemed to be tonsillitis clinically."	.....	.....	
16	"	Doubtful.	Large, pointed diph. (?) bacilli.	Virulent.	Not obtained.	.....	.....	
17	"	Suspected diphtheria.	Very small typical diphtheria bacilli.	"	Severe.	Not known.	Not known.	

No.	Date.	Physician's diagnosis accompanying cultures.	Result of bacteriological examination.	Result of animal inoculation.	History of the case.	As to infection of others.	How contracted.	Remarks.
	1893							
36	Feb. 12	Follicular tonsillitis.	A few bacilli, typical in shape, but with even staining.	Virulent.	Course of disease that of a true diphtheria.	.....	.....	
37	" 18	Tonsillitis?	Typical diphtheria bacilli.	Non-virulent.	Clinically an acute tonsillitis, very mild.	Diphtheria prevailing in the institution.	Inmate of an institution.	
38	" 18	Tonsillitis?	Typical diphtheria bacilli.	Virulent.	Clinically a case of true diphtheria, mild.	Diphtheria prevailing in the institution.	Inmate of an institution.	
39	" 10	Diphtheria?	Typical diphtheria bacilli.	"	Began with convulsions and high fever; at first apparently follicular tonsillitis; later scarlet fever and diphtheria.	None.	None.	
40	" 27	Diphtheria?	Small, but typical diphtheria bacilli.	"	Clinically a very mild case of acute tonsillitis.	Diphtheria prevailing in the institution.	Inmate of an institution.	
41	" 27	Diphtheria?	Typical diphtheria bacilli.	"	Not obtained.	Not known.	Not known.	
42	March 4	Pharyngeal diphtheria?	Typical diphtheria bacilli.	"	No information obtainable.	Not known.	Not known.	Inmate of an institution.
43	" 6	Rhinitis and pharyngitis.	Typical diphtheria bacilli.	"	No information obtainable.	Not known.	Not known.	Except for occurrence of previous case no culture would have been taken.
44	" 8	Pharyngeal diphtheria.	Typical diphtheria bacilli.	"	Clinically appeared to be a very mild acute pharyngitis; no membrane.	.....	From another case in family.	This and succeeding case in same family.
45	" 11	Acute tonsillitis.	Typical diphtheria bacilli.	"	A moderately severe true diphtheria; extensive membrane.	.....	From another case (membr. croup) in same family, but in another house.	This and previous case in same family.
46	" 11	Acute tonsillitis.	A few typical diphtheria bacilli.	"	A moderately severe true diphtheria; extensive membrane.	.....	Same as above.	
47	April 5	Follicular tonsillitis.	Typical diphtheria bacilli.	"	At first follicular tonsillitis, throat had cleared up; then severe croup requiring intubation.	Not known.	Not known.	
48	" 6	Follicular tonsillitis.	Typical diphtheria bacilli.	"	Appeared nearly to be a moderately severe case of true diphtheria.	1 case, same family.	Not known.	Antitoxin administered; case recovered.

We may refer, in conclusion, to the following classes of causes :

First. The healthy throats in which diphtheria-bacilli are present. In these cases investigation almost always shows that the individuals have been in contact with cases of diphtheria. The presence of the bacilli in the throat without any lesions does not, of course, indicate the existence of the disease.

Second. The simple anginas in which virulent diphtheria-bacilli are found. These are to be regarded, from a sanitary standpoint, in exactly the same way as cases of true diphtheria.

Third. Cases of true diphtheria presenting the ordinary clinical features of diphtheria and showing the Löffler bacilli.

Fourth. Cases of angina associated with the production of membrane in which no diphtheria-bacilli are found. These might be regarded, from a clinical standpoint, as diphtheria; but bacteriological examination shows that some other organism than the Löffler bacillus is the cause of the process.

It may be urged that the cases described in this paper were possibly instances of streptococcus-inflammation of the throat in which diphtheria-bacilli chanced to be present in the throat-secretions and were only accidental accompaniments and not the cause of the inflammation.

This inference does not appear to be justified, and the only excuse for it would seem to be the desire to retain the anatomical conception of diphtheria—i. e., that it is always an inflammation associated with the formation of a false membrane. It is this conception which I particularly wish to combat, and I desire especially to emphasize the statement that all inflammations of mucous membranes due wholly or in part to the Klebs-Löffler bacillus should be included under the name diphtheria without reference to the site or extent or intensity of the inflammatory process or the character of the exudate.

SUBPLEURAL PULMONARY ABSCESS,

WITH REPORT OF CASES.

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No disease of the lungs presents more difficulties to the student than abscess, not only on account of its rarity and of the uncertainties of diagnosis, but also because the various forms of abscess not being clearly discriminated from one another, there is an apparent discordance between the observations of the pathologist and of the clinician. The former finds what seems irreparable destruction of pulmonary tissue at the autopsy. The latter reports cases of large abscesses which terminate